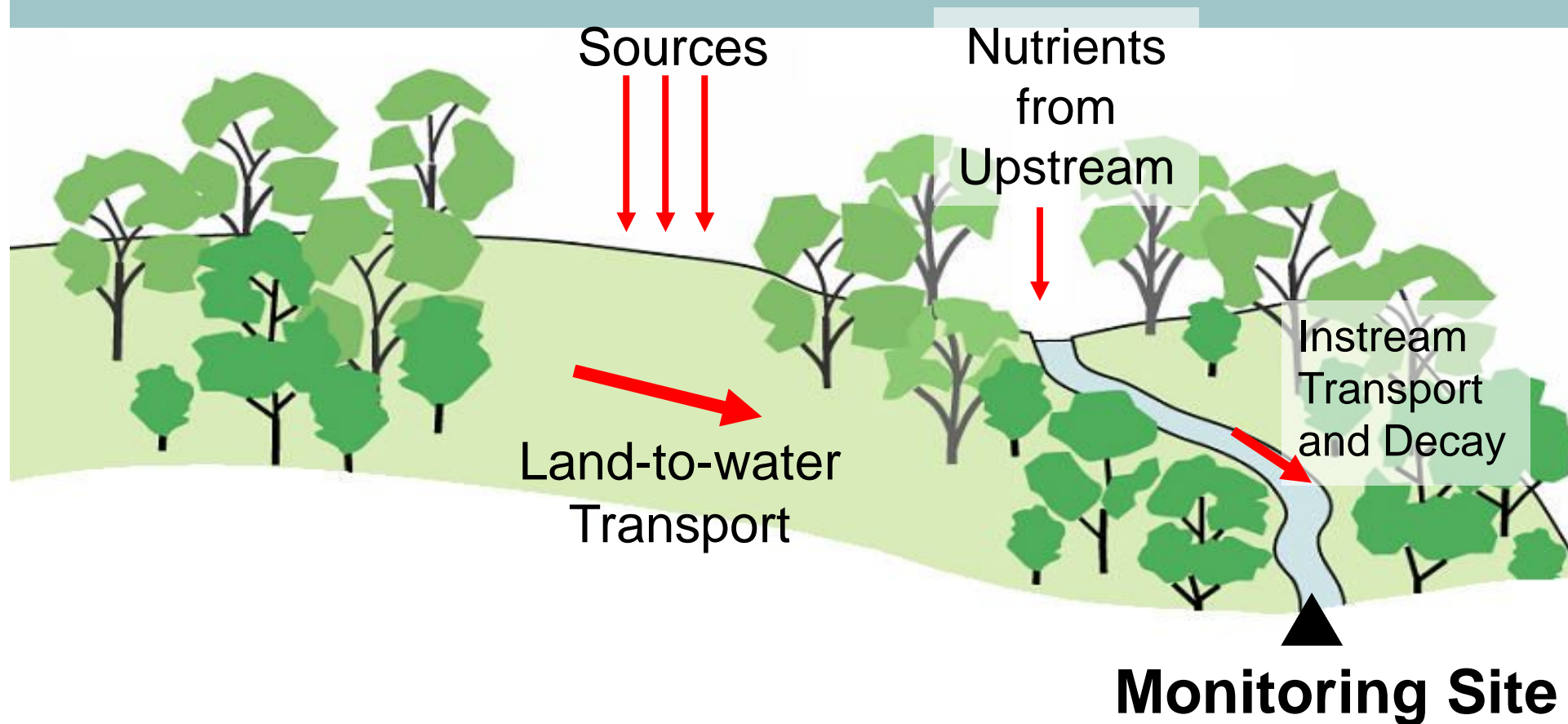




# **A Web-Based Tool for Evaluating Surface-Water Nutrient Conditions across the Pacific Northwest**

Daniel Wise, Hydrologist  
US Geological Survey  
Portland, OR

# SPARROW Relates Monitoring Data to Information on Watershed Characteristics and Nutrient Sources



# Nutrient Sources Explicitly Considered in the PNW SPARROW Models

## Point Sources

WWTP's

Fish Hatcheries

Industrial Facilities

## Nonpoint Sources

Farm Fertilizer

Livestock Waste

Developed Land (mostly fertilizer)

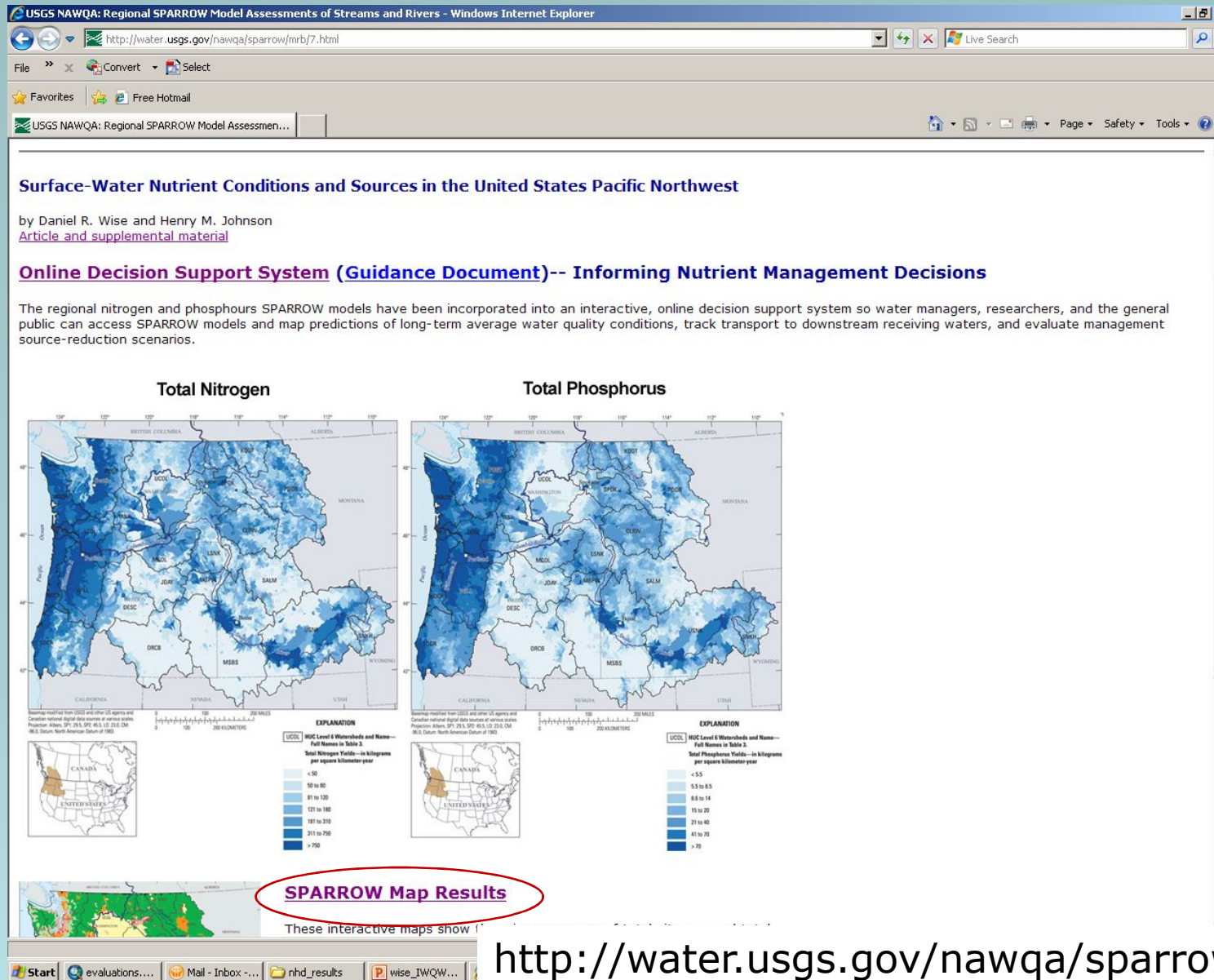
Atmospheric N Deposition

Forest Land (N fixation)

Red Alder Trees (N fixation)

Geologic Phosphorus

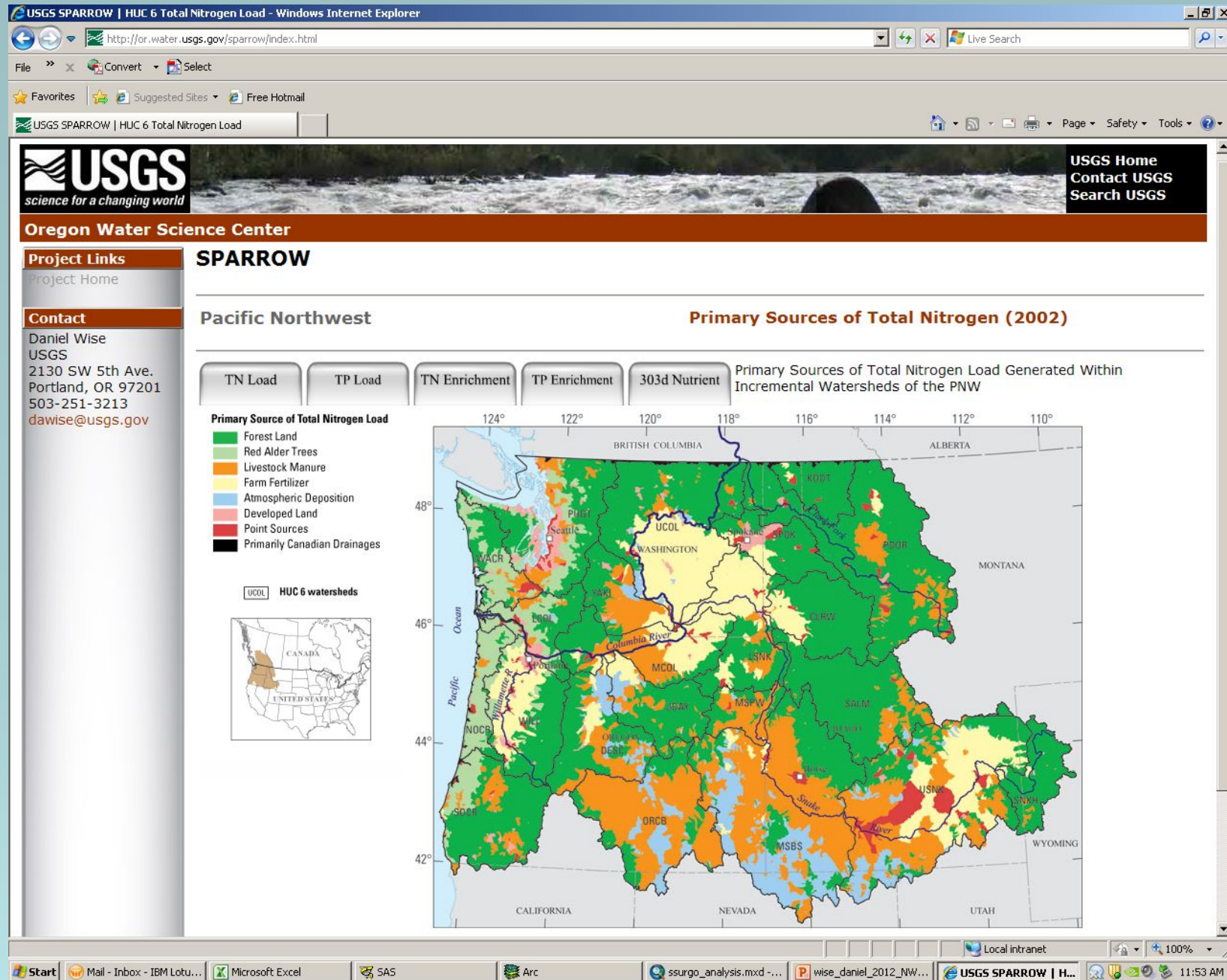
# PNW SPARROW Web Applications



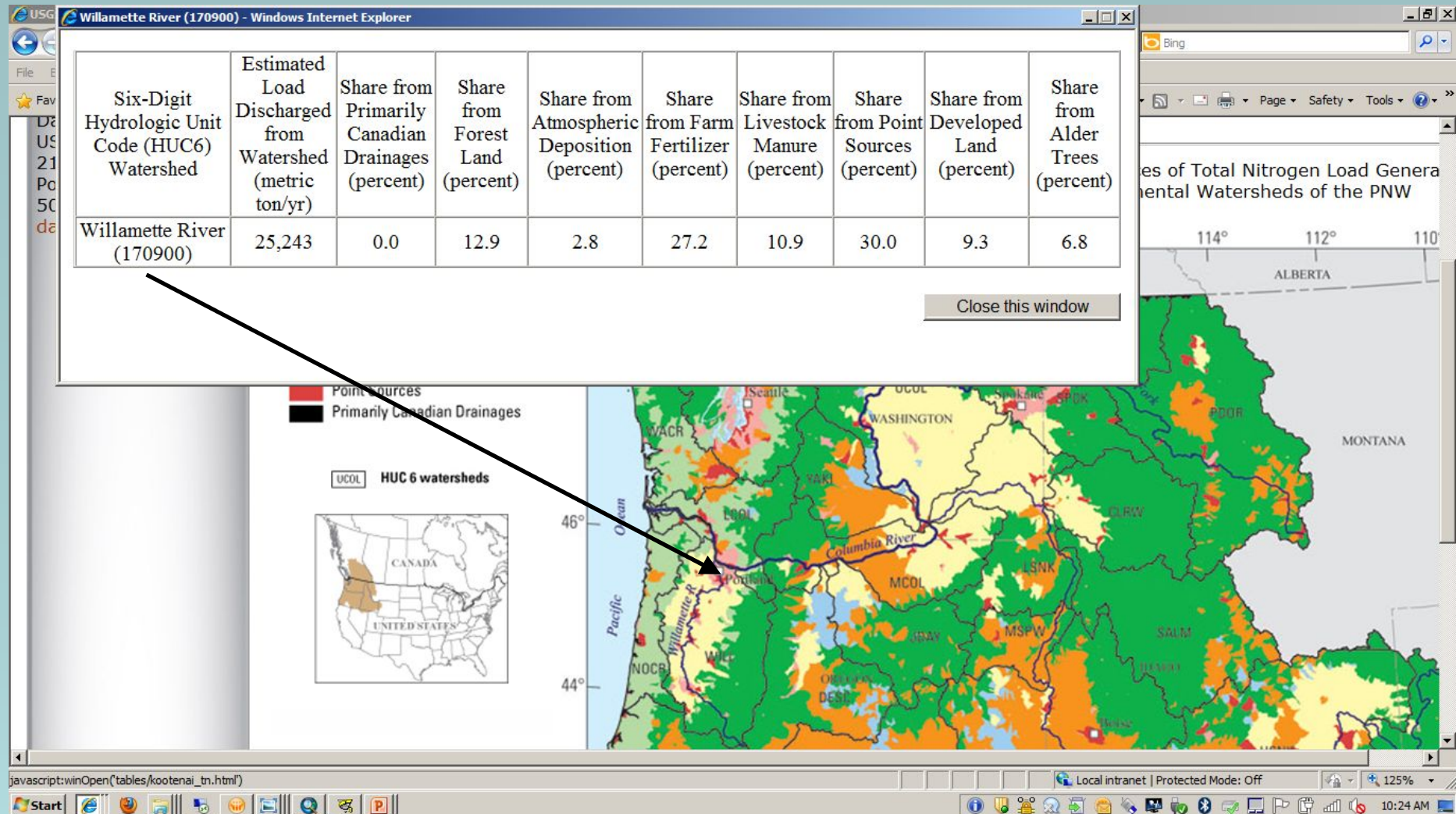
<http://water.usgs.gov/nawqa/sparrow/mrb/7.html>



# PNW SPARROW Web Applications

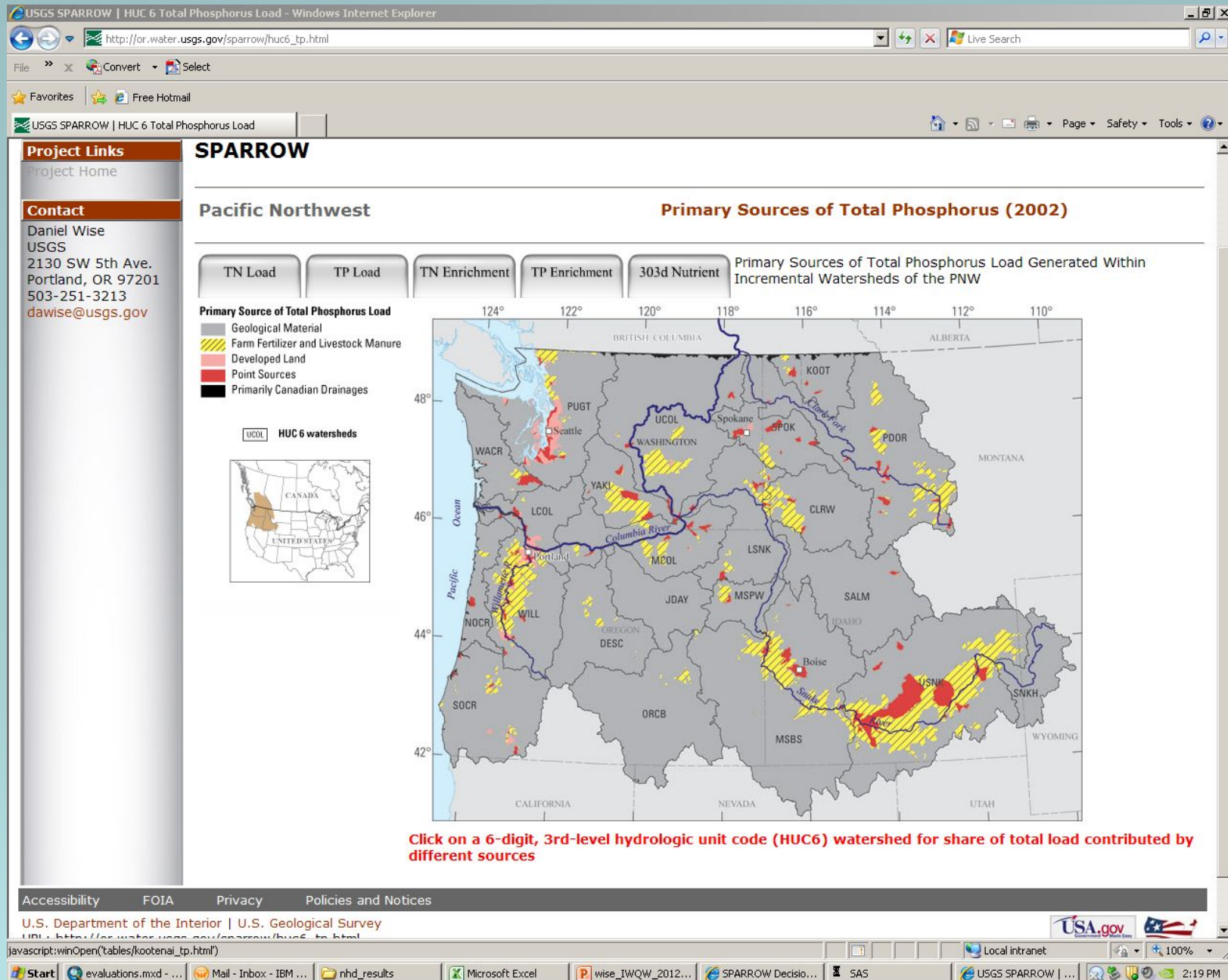


# PNW SPARROW Web Applications





# PNW SPARROW Web Applications



# PNW SPARROW Web Applications

USGS SPARROW | HUC 6 Total Phosphorus Load - Windows Internet Explorer

http://or.water.usgs.gov/sparrow/huc6\_tp.html

File » X Convert Select

★ Favorites Free Hotmail

USGS SPARROW | HUC 6 Total Phosphorus Load - Windows Internet Explorer

File Edit View F

★ Favorites

USGS SPARROW |

Daniel Wise  
USGS  
2130 SW 5th  
Portland, OR  
503-251-321  
dawise@usgs

Six-Digit Hydrologic Unit Code (HUC6) Watershed	Estimated Load Discharged from Watershed (metric ton/yr)	Share from Primarily Canadian Drainages (percent)	Share from Geologic Material (percent)	Share from Farm Fertilizer and Livestock Manure (percent)	Share from Point Sources (percent)	Share from Developed Land (percent)
Willamette River (170900)	2,438	0.0	45.2	19.7	27.5	7.5

Close this window

Phosphorus Load Generated Within Incremental

112° 110°

ALBERTA

MONTANA

WYOMING

BOISE

MSBS

SNKH

SNK

LSNK

SALM

JOAHO

CLRW

PDOR

SPOK

UCOL

WASHINGTON

YAKI

LCOL

MEOL

JDAY

MSPW

OREGON

DESC

ORCB

SOOCR

NOCR

WILL

WACR

PUGT

Seattle

Spokane

Columbia River

Willamette River

Pacific Ocean

48°

46°

44°

42°

Primarily Canadian Drainages

HUC 6 watersheds

UNITED STATES

CANADA

Local intranet | Protected Mode: Off

100%

3:42 PM

U.S. Department of the Interior | U.S. Geological Survey

URL: http://or.water.usgs.gov/sparrow/huc6\_tp.html

javascript:winOpen('tables/kootenai\_tp.html')

Start evaluations.mxd Mail - Inbox - IBM ... nhd\_results Microsoft Excel wise\_TWQW\_2012... SPARROW Decisio... SAS USGS SPARROW | ... 2:19 PM



# PNW SPARROW Web Applications

USGS NAWQA: Regional SPARROW Model Assessments of Streams and Rivers - Windows Internet Explorer

http://water.usgs.gov/nawqa/sparrow/mrb/7.html

File » X Convert Select

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USGS NAWQA: Regional SPARROW Model Assessmen...

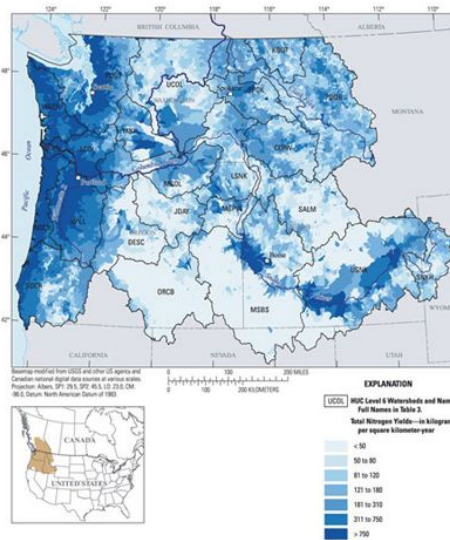
## Surface-Water Nutrient Conditions and Sources in the United States Pacific Northwest

by Daniel R. Wise and Henry M. Johnson  
[Article and supplemental material](#)

**Online Decision Support System (Guidance Document)-- Informing Nutrient Management Decisions**

The regional nitrogen and phosphorus SPARROW models have been incorporated into an interactive, online decision support system so water managers, researchers, and the general public can access SPARROW models and map predictions of long-term average water quality conditions, track transport to downstream receiving waters, and evaluate management source-reduction scenarios.

### Total Nitrogen



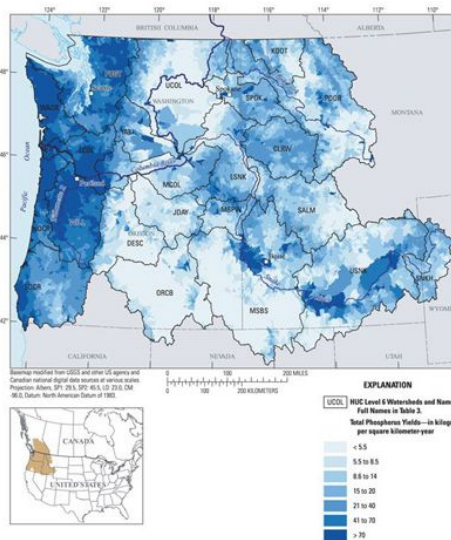
EXPLANATION

UCOL HUC Level 6 Watersheds and Name--  
Full Names in Table 2

Total Nitrogen Yields--in kilograms  
per square kilometer year

<50  
50 to 80  
81 to 120  
121 to 180  
181 to 210  
211 to 750  
>750

### Total Phosphorus



EXPLANATION

UCOL HUC Level 6 Watersheds and Name--  
Full Names in Table 3

Total Phosphorus Yields--in kilograms  
per square kilometer year

<5.5  
5.5 to 8.5  
8.5 to 14  
15 to 20  
21 to 40  
41 to 70  
>70

**SPARROW Map Results**

These interactive maps show

Start evaluations... Mail - Inbox -... nhd\_results wise\_IWQW...

<http://water.usgs.gov/nawqa/sparrow/mrb/7.html>

# SPARROW Decision Support System

USGS NAWQA: Regional SPARROW Model Assessments of Streams and Rivers - Windows Internet Explorer

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Favorites Free Hotmail

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### Total Nitrogen

Source: Modified from USGS and other US agency and Canadian national digital data sources at various scales. Projection: Albers, SP: 283, 972, 493, 10, 7318, 0M. 48.5, Datum: North American Datum of 1983.

EXPLANATION

USGS Level 6 Watersheds and Name--  
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Total Nitrogen Yields--in kilograms  
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< 50
50 to 80
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EXPLANATION

USGS Level 6 Watersheds and Name--  
Full Names in Table 2

Total Phosphorus Yields--in kilograms  
per square kilometer year

< 5.0
5.0 to 6.5
6.5 to 14
15 to 20
21 to 40
41 to 70
> 70

**SPARROW Map Results**

These interactive maps show the primary sources of total nitrogen and total

Local intranet 100%

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# SPARROW Decision Support System

SPARROW Decision Support System - Windows Internet Explorer

http://cida.usgs.gov/sparrow/#modelid=43

File Edit View Favorites Tools Help

SPARROW Decision Support System

**USGS**  
science for a changing world

**USGS Home**  
Contact USGS  
Search USGS

**SPARROW Decision Support System**

**Find a Model by Geographic Location:**  
Select a region or state. When a state is selected, all models containing that state are listed.



Any Region or State

**Find a Model by Modeled Constituent:**  
Any

**Models matching your criteria** (click a model to show details)

- National Suspended Sediment Model - 1992
- National Total Nitrogen Model - 1992
- National Total Phosphorus Model - 1992
- Total Dissolved Solids Model for the Rio Grande, Colorado, and Great Basin Region - 2006

**Documentation and Further Reading**

- What is SPARROW?
- What is SPARROW Decision Support?
- SPARROW Applications & Documentation
- SPARROW FAQs

**Tutorial Videos**

Select a video... Watch now >>

**Found a bug or have a comment?**  
Please send bugs, suggestions and questions to the [SPARROW Decision Support System Administrator](#).

**Selected Model**

**2002 Total Nitrogen Model for the U.S. Pacific Northwest**



Explore this model in the Decision Support System >>

**Modeled Constituent:** Nitrogen  
**Base Year:** 2002  
**Stream Network:** Enhanced River Reach File 2.0  
**Reference:** Surface-Water Nutrient Conditions and Sources in the United States Pacific Northwest

**Watershed Based Sessions**  
To start the DSS with the outlet river reach of a major watershed selected for downstream tracking, select a watershed and click Go.

Snake River Headwaters Watershed Go >>

**Scenario Based Sessions**  
To start the DSS with a predefined scenario, click on the link for one of the scenarios below.

Done

Slide 20 of 22 1 - Default Design

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**USGS**  
science for a changing world

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Map of the United States showing state boundaries and abbreviations.

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# SPARROW Decision Support System

SPARROW Decision Support System - Windows Internet Explorer

http://aida.usgs.gov/sparrow/#modelid=3

Select an application

**USGS**  
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**SPARROW Decision Support System**

**Find a Model by Geographic Location:**  
Select a region or state. When a state is selected, all models containing that state are listed.



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Any

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- National Suspended Sediment Model - 1992
- National Total Nitrogen Model - 1992
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Slide 20 of 22 1\_Default Design

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# SPARROW Decision Support System

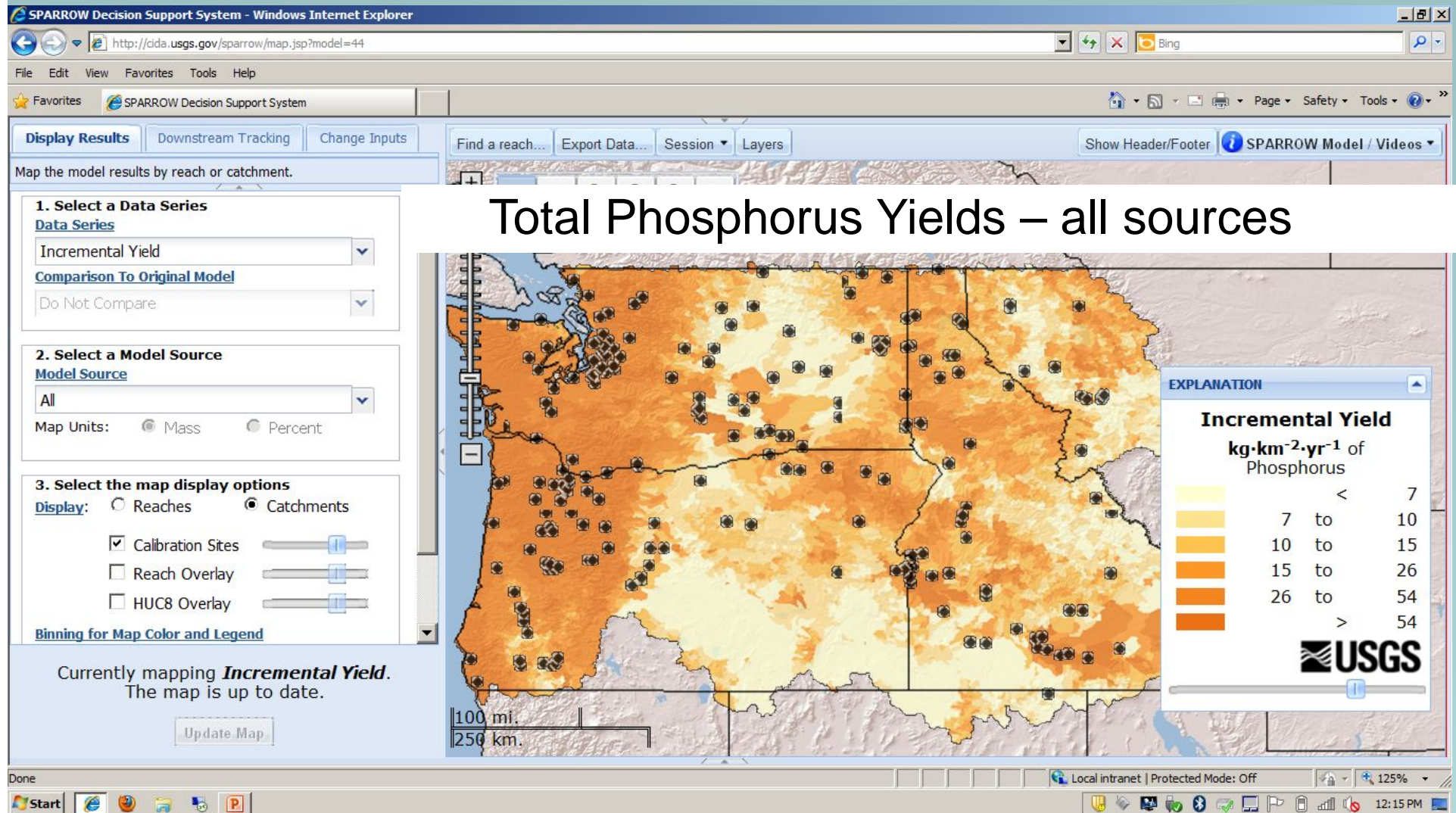
- Predict water-quality conditions where no water-quality data are available
- Predict contaminant delivery by source type and location
- Predict changes in water-quality conditions under different management scenarios



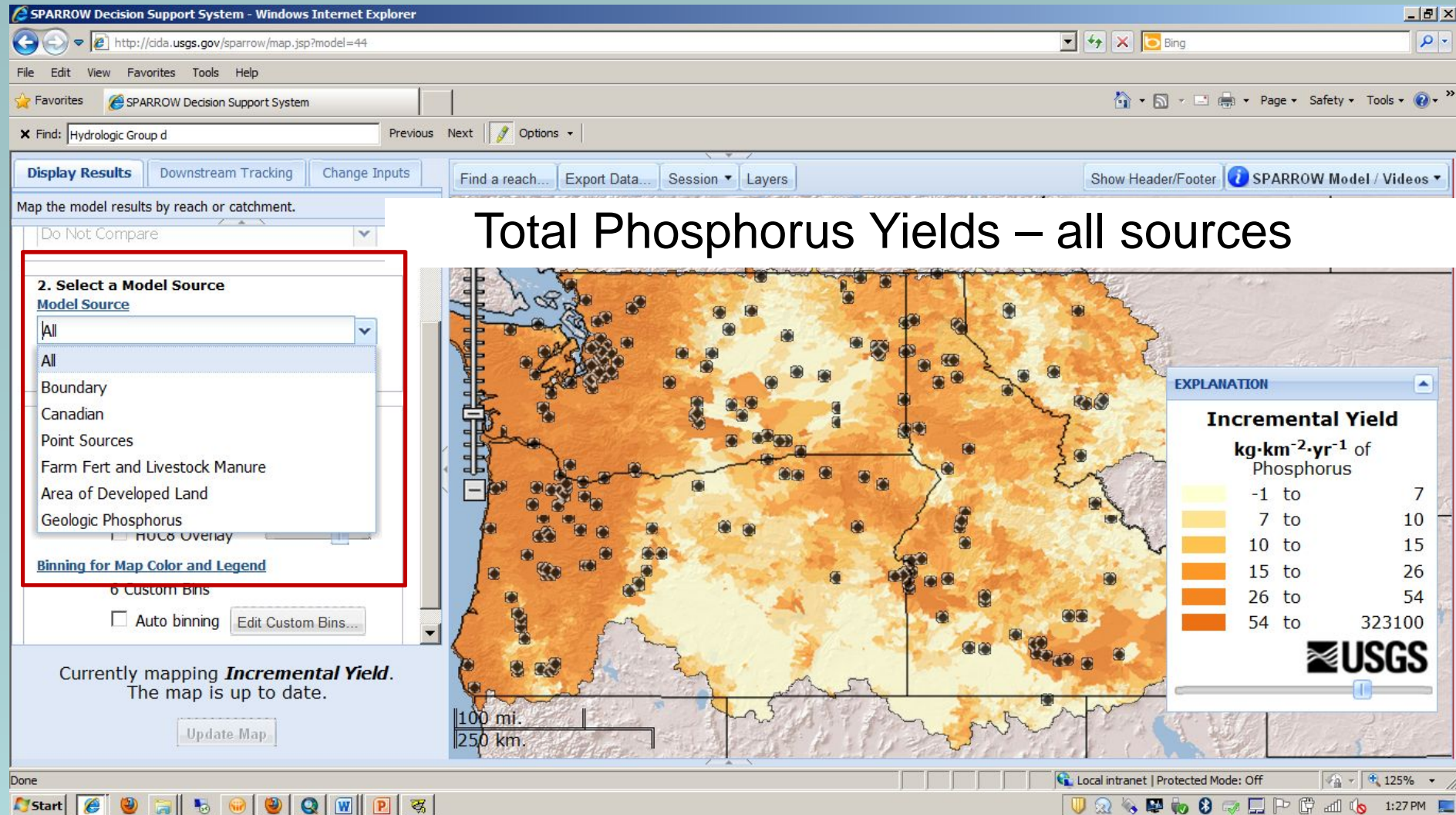
# SPARROW Decision Support System

- **Predict water-quality conditions where no water-quality data are available**
- Predict contaminant delivery by source type and location
- Predict changes in water-quality conditions under different management scenarios

# Predicting Water-Quality Conditions

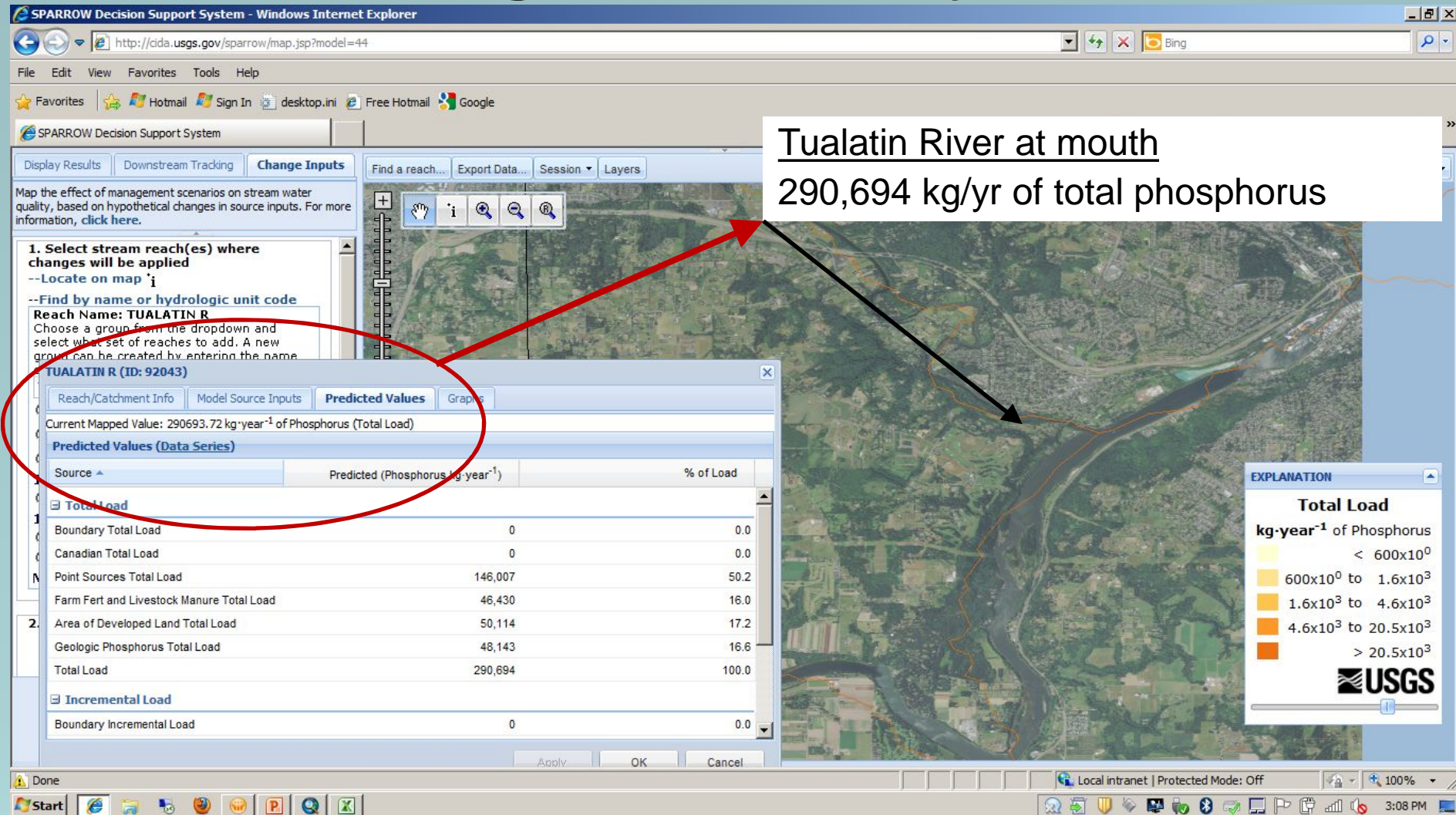


# Predicting Water-Quality Conditions





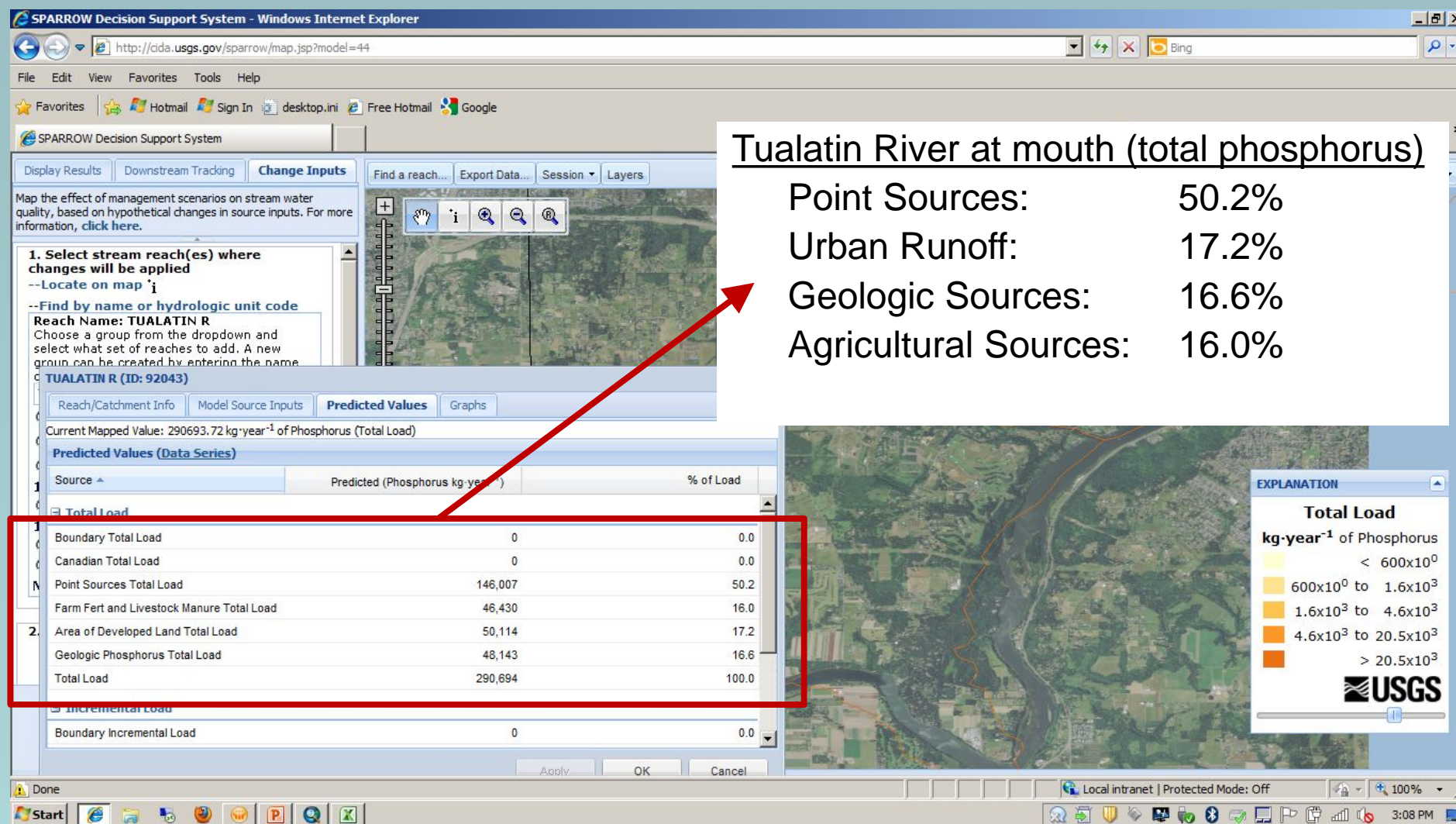
# Predicting Water-Quality Conditions



# SPARROW Decision Support System

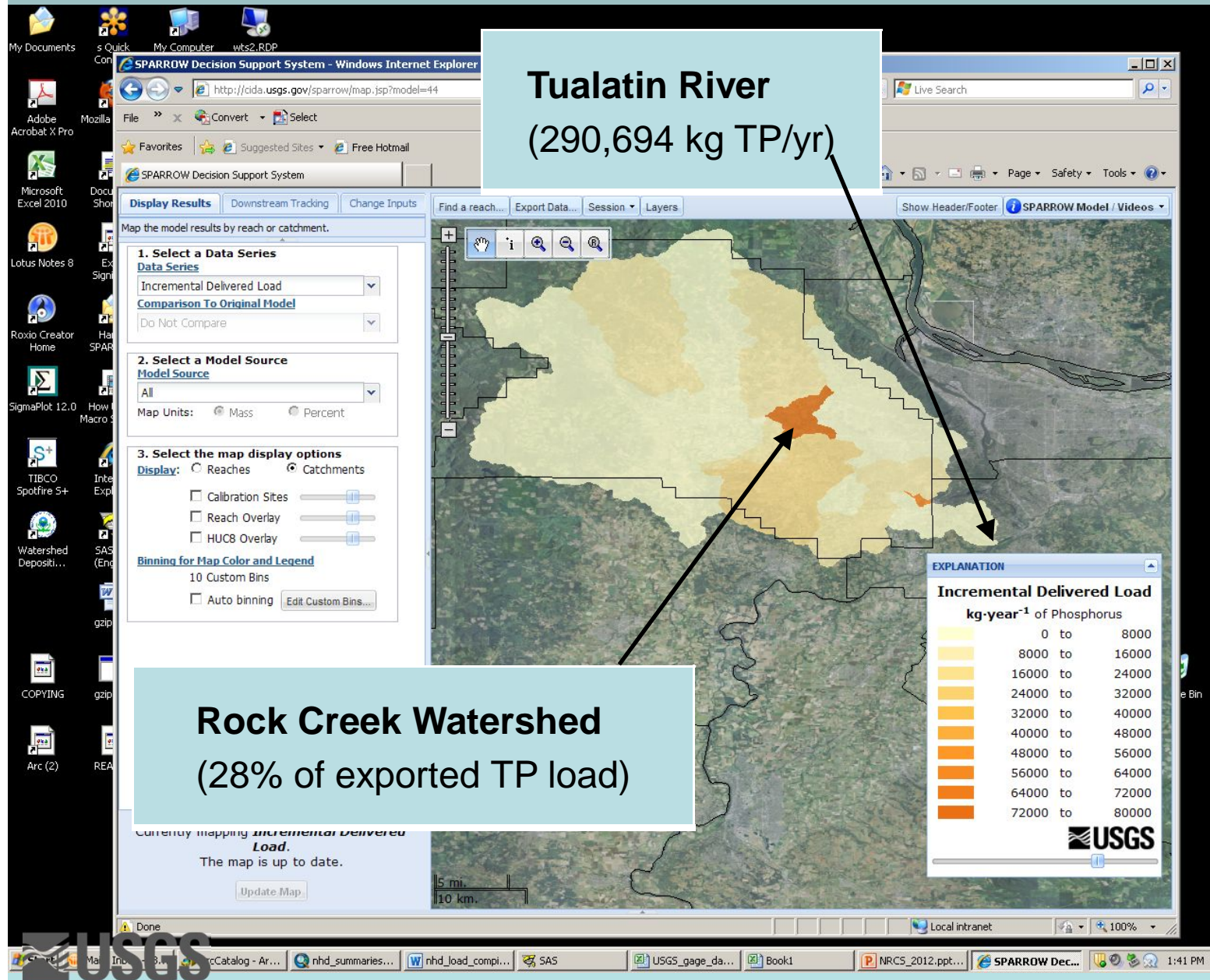
- Predict water-quality conditions where no water-quality data are available
- **Predict contaminant delivery by source type and location**
- Predict changes in water-quality conditions under different management scenarios

# Contribution from Different Sources





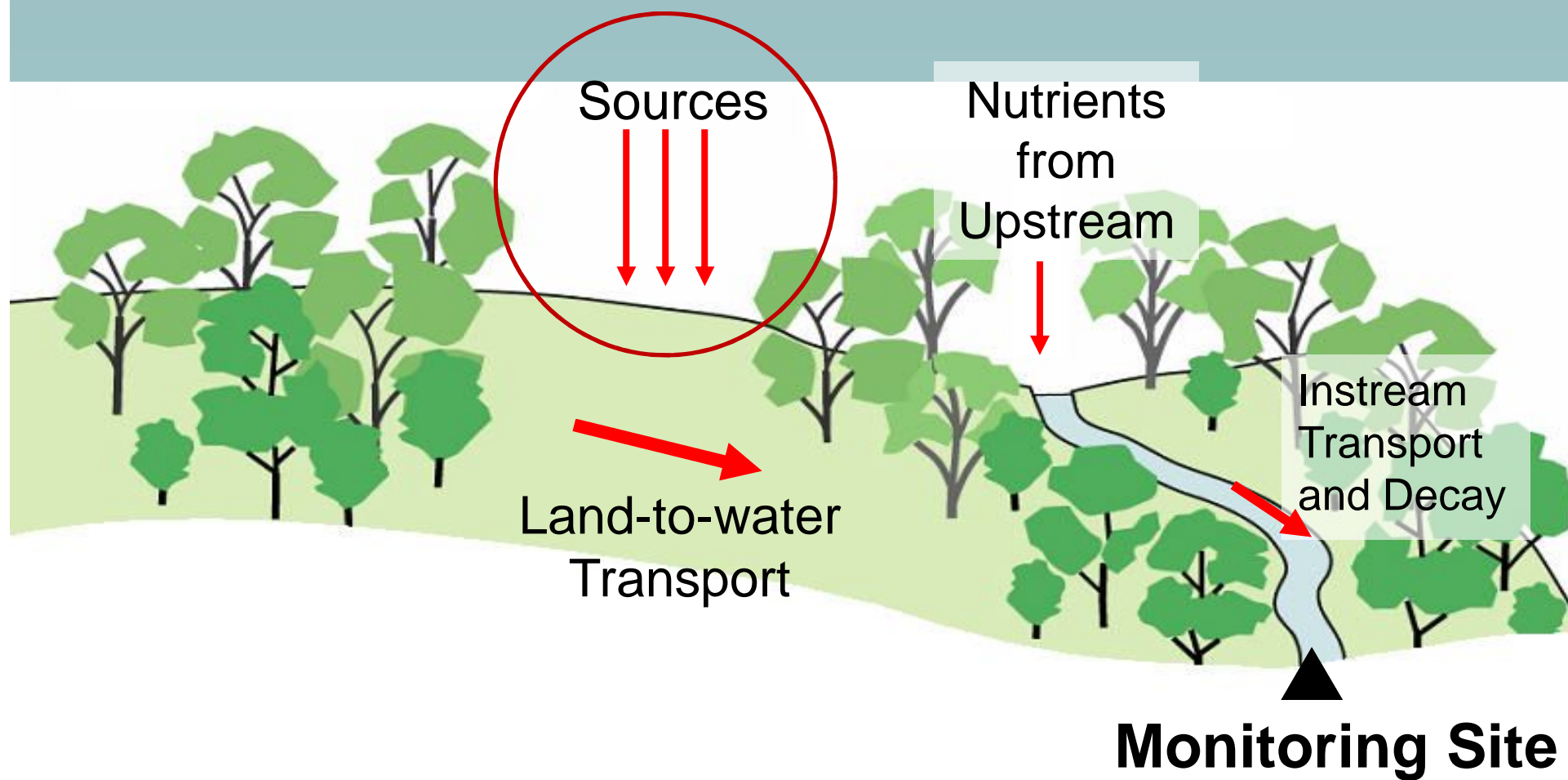
# Delivery to Downstream Waters



# SPARROW Decision Support System

- Predict water-quality conditions where no water-quality data are available
- Predict contaminant delivery by source type and location
- **Predict changes in water-quality conditions under different management scenarios**

# Running Management Scenarios



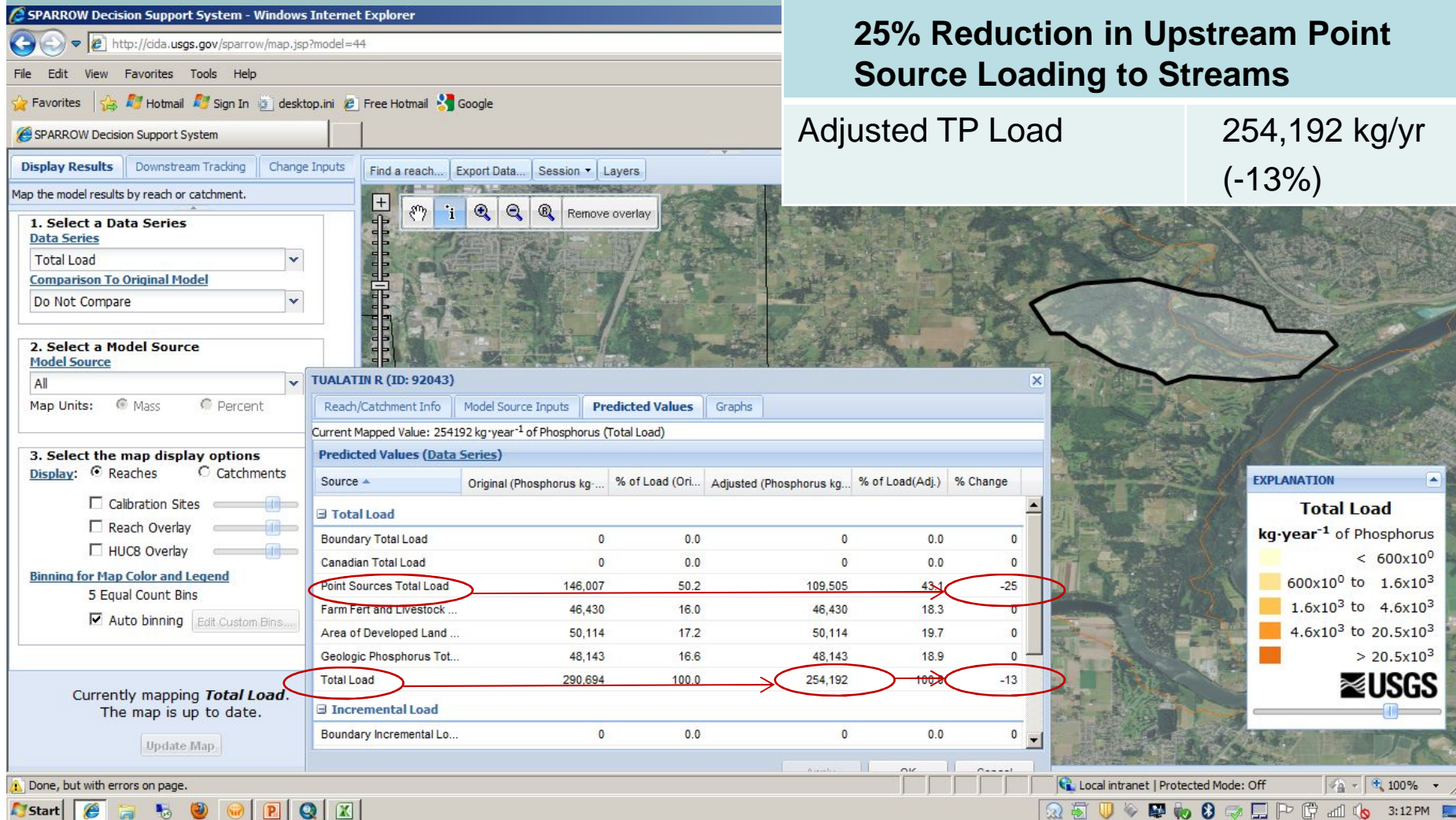


# Running Management Scenarios

## Tualatin River at mouth 25% Reduction in Upstream Point Source Loading to Streams

Adjusted TP Load

254,192 kg/yr  
(-13%)



# How can this information be used?



- \* Prioritize Areas for Nutrient Reduction
- \* Identify Important Sources of Nutrients
- \* Evaluate Nutrient Reduction Plans

# How can I get more information?



- SPARROW Information:

<http://water.usgs.gov/nawqa/sparrow/>

- PNW Regional Models:

<http://water.usgs.gov/nawqa/sparrow/mrb/7.html>

- Decision Support System

<http://water.usgs.gov/nawqa/sparrow/dss/>

- Contact:

Daniel Wise ([dawise@usgs.gov](mailto:dawise@usgs.gov))

503-251-3213